# How do new things spread?
# The diffusion of digital low-carbon innovations

Oxford Energy Colloquium

November 2020

Charlie Wilson

silci.org

SILCI

Social Influence and *disruptive* Low Carbon Innovations

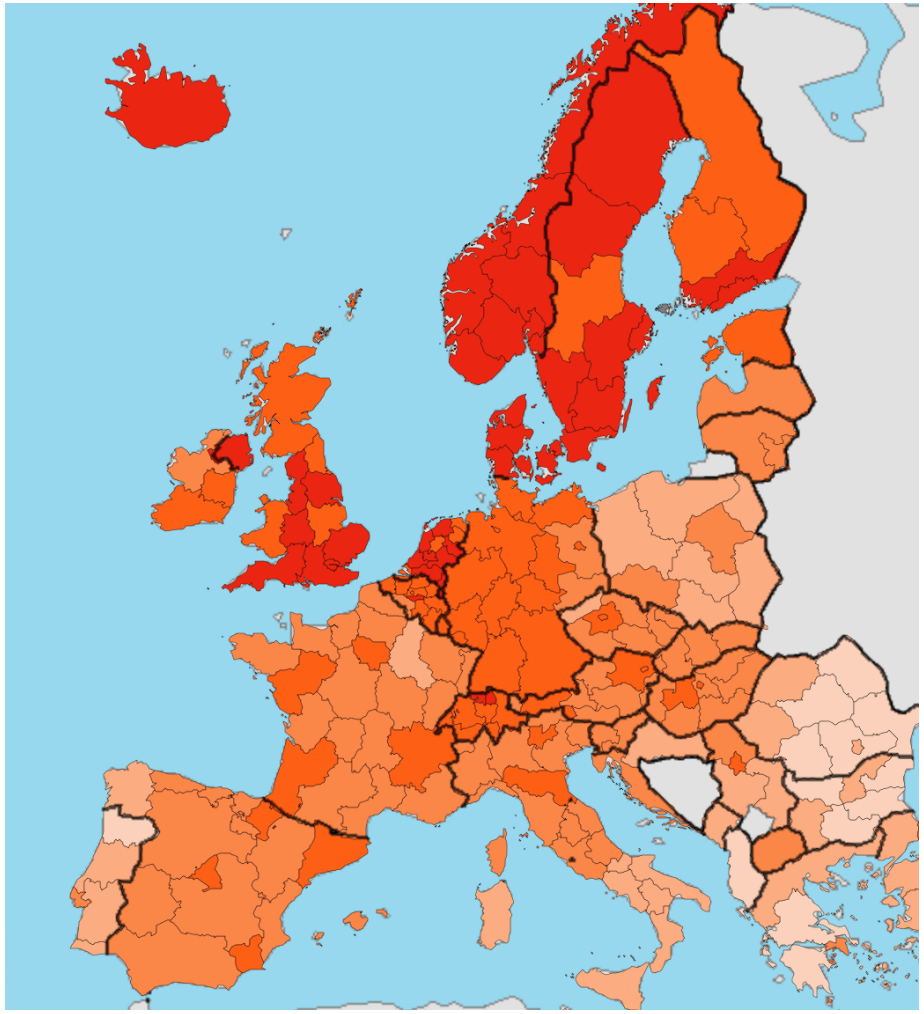
Tyndall Centre

for Climate Change Research

erc European Research Council

Starting Grant #678799

# Life is digitalising.

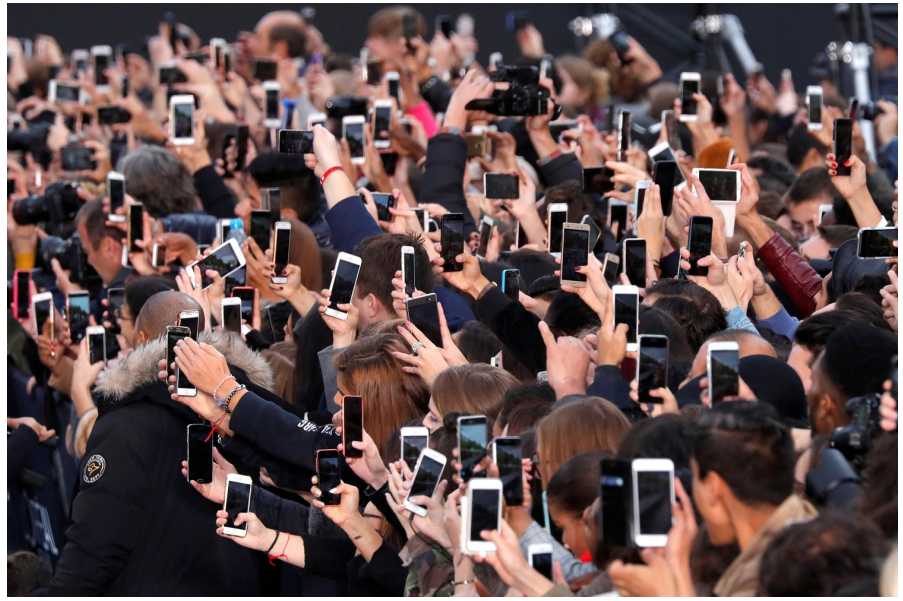


Eurostat Statistical Atlas (2020). Regional yearbook 2020.

**9.1 Daily internet users during the three months preceding the survey, 2019**

Daily internet users during the three months preceding the survey, 2019 (% of people aged 16-74 years, by NUTS 2 regions)
EU-27 = 77

- < 60
- 60 - < 70
- 70 - < 80
- 80 - < 90
- ≥ 90
- Data not available



The Atlantic [www.theatlantic.com/photo/2018/11/smartphones-are-everywhere/575878/]

# Overview of talk.

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Social Influence and *disruptive* Low Carbon Innovations

1. Potential climate benefits of digital consumer innovations
2. How new things spread
3. New evidence on the diffusion of digital low-carbon innovations
4. Implications

# Climate impacts of digitalisation tend to focus on (1) supply & infrastructure, (2) employment.

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... and are highly uncertain

# Digital *consumer* innovations can potentially help reduce emissions in (at least) five ways.

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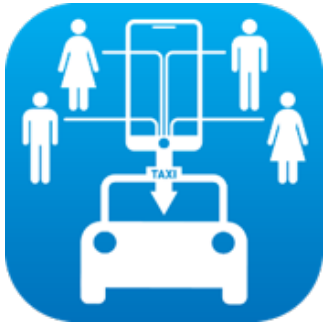
(1) Shift from owning to **accessing**.

car clubs

ride-
sharing




shared
ride-hailing

# Digital *consumer* innovations can potentially help reduce emissions in (at least) five ways.

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(1) Shift from owning to **accessing**.

(2) Increase **utilisation** & reduce waste.

P2P car-sharing

11th hour apps

P2P electricity

# Digital *consumer* innovations can potentially help reduce emissions in (at least) five ways.

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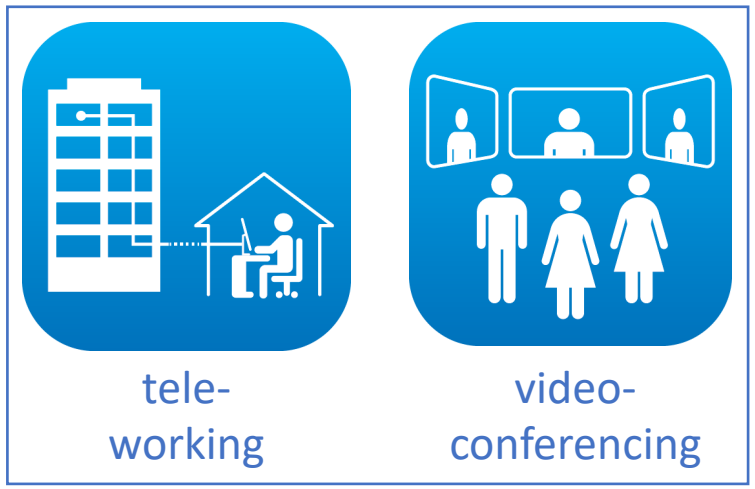
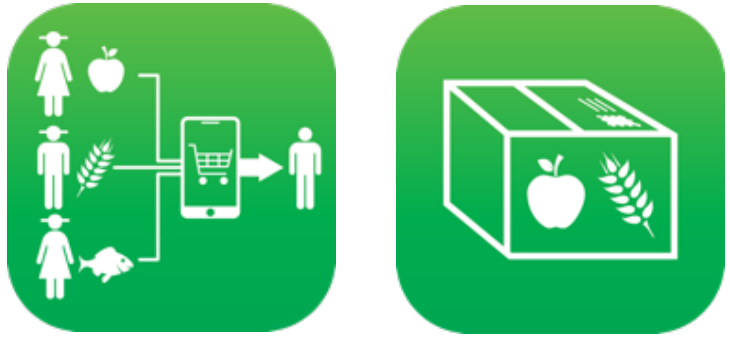
(1) Shift from owning to **accessing**.

(2) Increase **utilisation** & reduce waste.

(3) Substitute for physical **movement**.



# Digital *consumer* innovations can potentially help reduce emissions in (at least) five ways.

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(1) Shift from owning to **accessing**.

(2) Increase **utilisation** & reduce waste.

(3) Substitute for physical **movement**.

(4) Improve **control** & management.
(+ electrification of end-use)

smart heating | smart lighting | electric vehicles | e-bikes

# Digital *consumer* innovations can potentially help reduce emissions in (at least) five ways.

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(1) Shift from owning to **accessing**.

(2) Increase **utilisation** & reduce waste.

(3) Substitute for physical **movement**.

(4) Improve **control** & management.
(+ electrification of end-use)

(5) Improve **system performance**.

smart home appliances

PV + storage

electric vehicle-to-grid

# Digital innovations can also challenge mainstream consumption norms.

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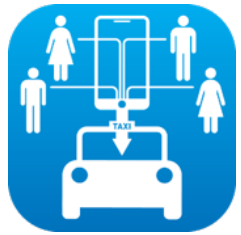
car clubs


P2P car-sharing


ride-sharing


shared ride-hailing


electric vehicles


e-bikes

driving fossil-fuelled cars (with low occupancy)


digital food hubs


meal kits


11th hour apps

doing big (meaty) supermarket food shops


smart heating


smart lighting


smart appliances


PV + storage


P2P electricity


electric vehicle-to-grid

using energy however whenever (supplied centrally)

Wilson, C. et al. (2020). "Potential climate benefits of digital consumer innovations." *Annual Review of Environment and Resources* 45: 113-144.

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Social Influence and *disruptive* Low Carbon Innovations

1. Potential climate benefits of digital consumer innovations
2. How new things spread
3. New evidence on the diffusion of digital low-carbon innovations
4. Implications

# How do new things spread?
# The **diffusion of** digital low-carbon **innovations**

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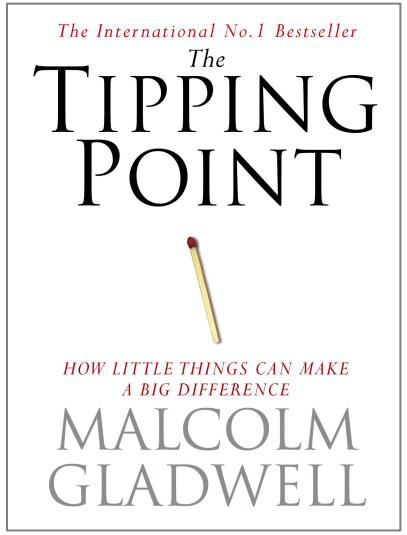
greenbanana.wordpress.com


***Diffusion*** *=*
*Communication over time*
*about an innovation*
*among members of a social system*

# How do new things spread?
# The **diffusion of innovations** … and viruses

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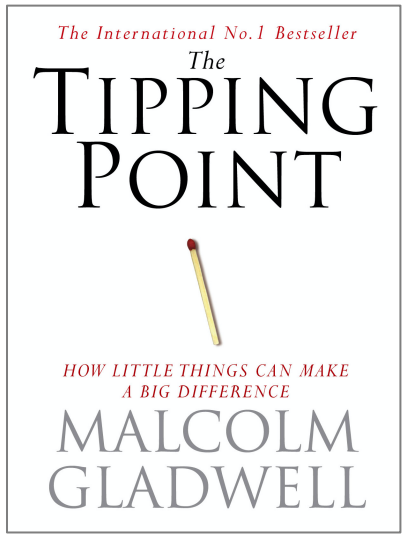
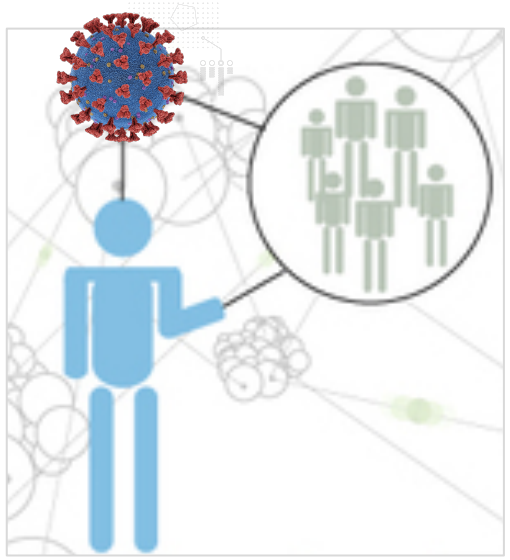
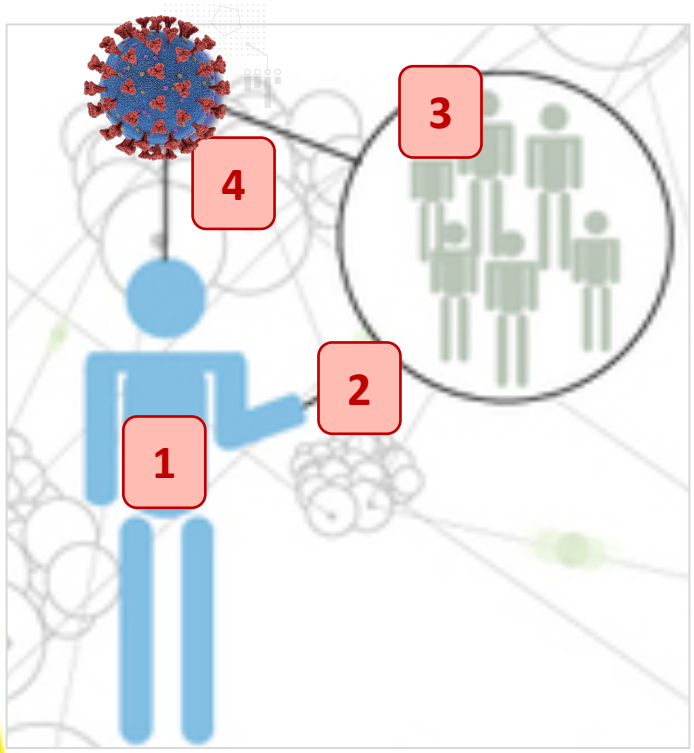



greenbanana.wordpress.com



e.g., Valente, T. W. (2010). *Social Networks and Health: Models, Methods, and Applications*. Oxford, UK, Oxford University Press.

# Four key mechanisms of virus transmission




**1 People are different (heterogeneity)**

- varying susceptibility to infection or potential for spreading

*e.g., age, profession, risk preferences & behaviours*

**2 Interpersonal transmission**

- infection through social contact

*e.g., talking, sneezing, touching*

**3 Social networks of interaction**

- number, frequency and diversity of social interactions

*e.g., travel & mixing*

**4 Attributes**

- characteristics of virus (which make it infectious)

*e.g., persistence, capacity to evade immune system*

# Four key mechanisms of innovation diffusion

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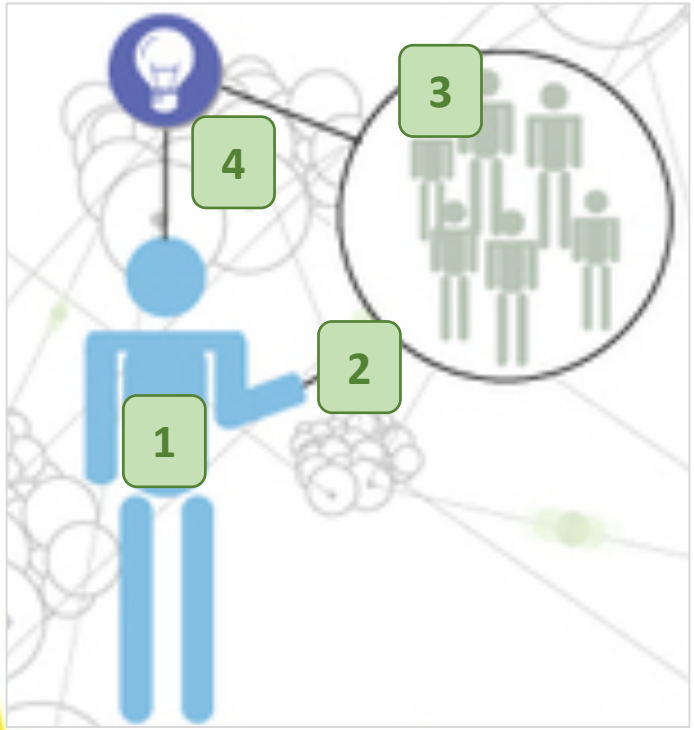


**1 People are different (heterogeneity)**

- varying tolerance for uncertainty, personal situation

*e.g., age, income, technophilia*

**2 Interpersonal transmission**

- information exchange through social contact

*e.g., word of mouth (WoM), peer effects*

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- characteristics of innovation (which make it appealing)

*e.g., ease of use, compatibility*

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# Over the past 3 years we've been collecting and analysing data on a diverse set of innovations.

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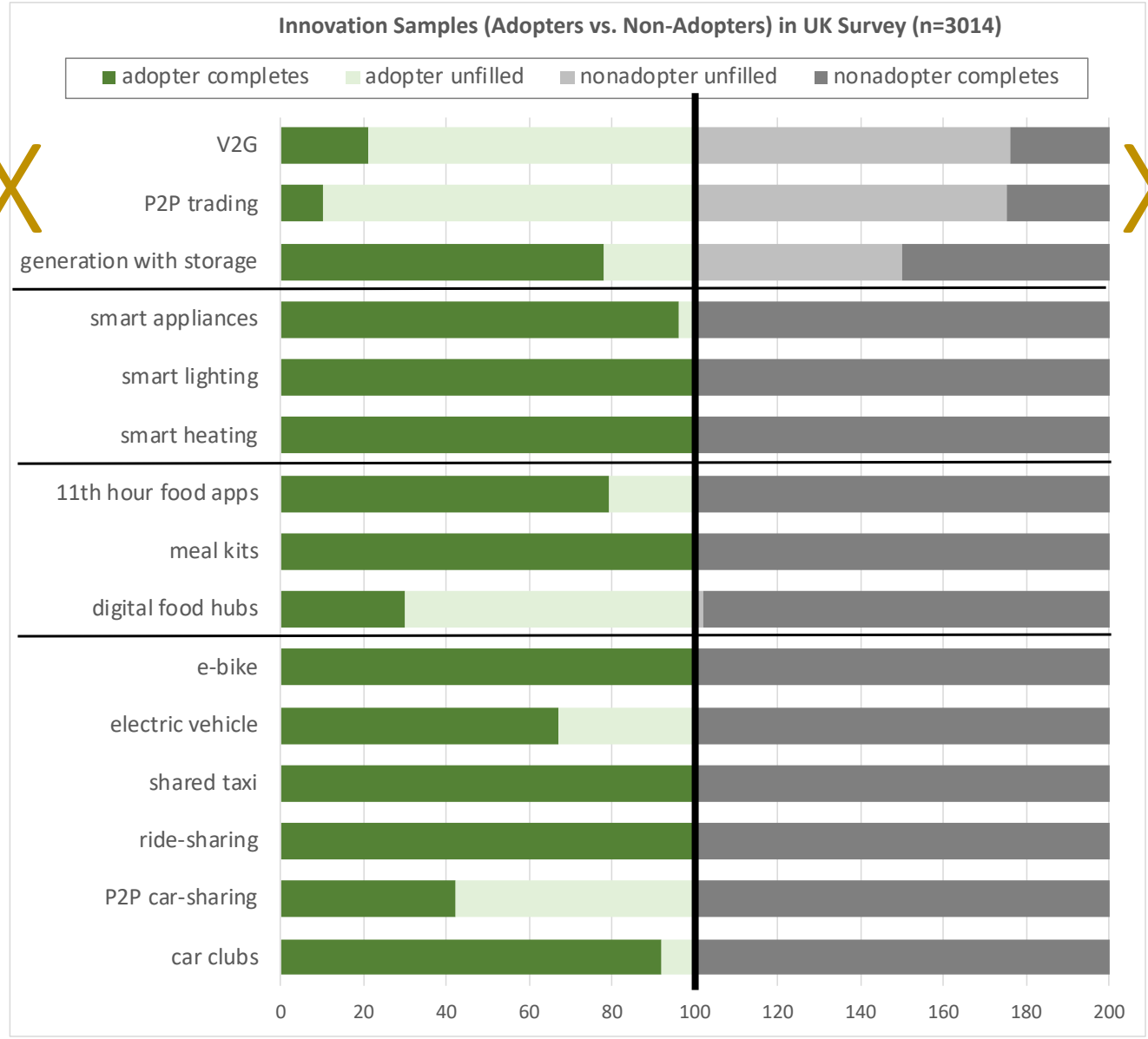
| | | |
|---|---|---|
| **Research team:** | me, Hazel, Barnaby | Emilie, Emma, Laurie, Mark |
| **Innovation-focus:** | *broad* (comparative analysis) | *deep* (case study analysis) |
| **Data collection:** | lit. review, structured elicitations | early adopter surveys, interviews, focus groups ... |

'BigSurvey' n=3,000 (UK + Canada)
Wave 1: Oct-Nov 2019
Wave 2: now!

# Sampling design:

quotas of
~100 adopters and
~100 non-adopters
per innovation

(UK sample, Oct 2019)



# Four key mechanisms of innovation diffusion

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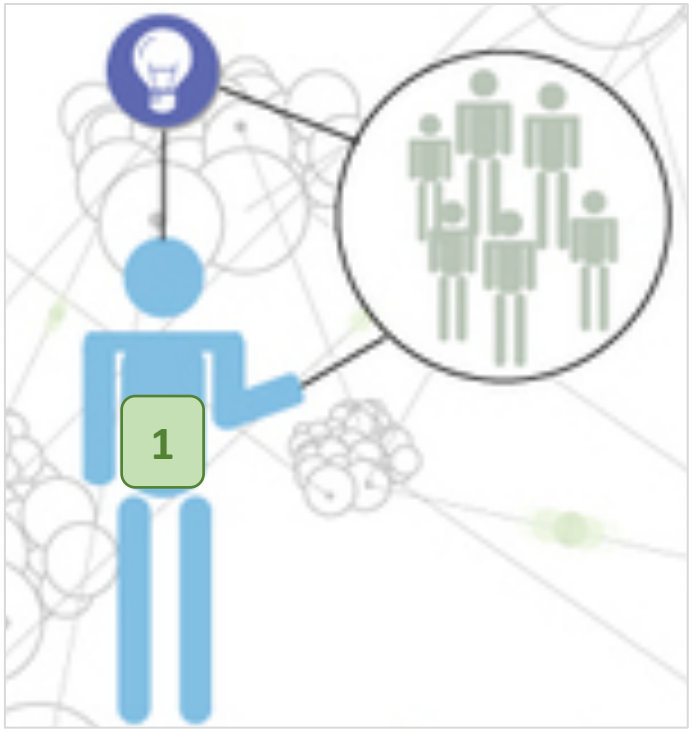


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- number, frequency and diversity of social interactions

*e.g., travel & mixing*

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- characteristics of innovation (which make it appealing)

*e.g., ease of use, compatibility*

# **Adoption propensity varies** as a function of personal characteristics & risk preferences.

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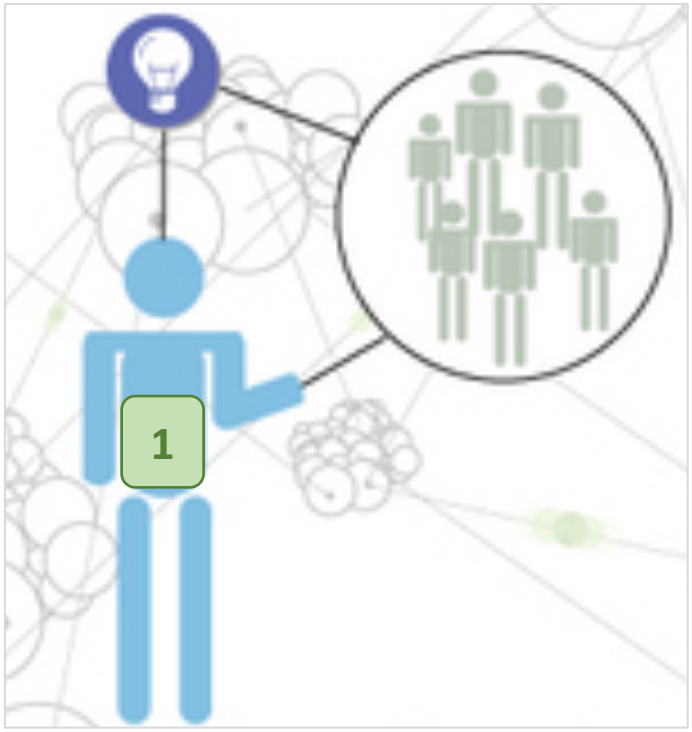


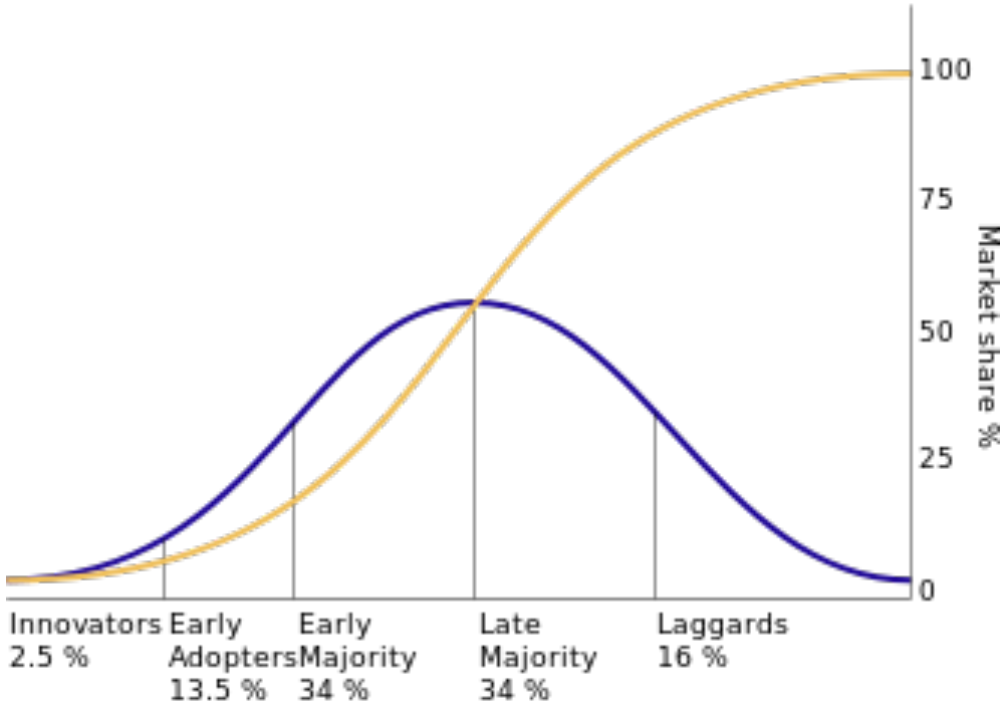


en.wikipedia.org/wiki/Diffusion_of_innovations

# Models predicting adopters (vs. non-adopters) test for differences **consistent across innovations.**

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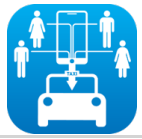







| Independent Variables | CAR CLUBS | P2P CAR-SHARING | RIDE-SHARING | SHARED RIDE-HAILING | EVS | E-BIKES | DIGITAL FOOD HUBS | MEAL KITS | 11TH HOUR APPS | SMART HOMES | SMART LIGHTING | SMART HOME APPLIANCES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOCIODEMOGRAPHICS CHARACTERISTICS** | | | | | | | | | | | | |
| Gender (Female) | - | | | | | | | | | | | |
| Age (Over 45) | 0.40 | | | | | | | | | | | |
| Education (Degree) | 3.00 | | | | | | | | | | | |
| Employment | 4.01 | | | | | | | | | | | |
| Household Income (Low) | - | | | | | | | | | | | |
| Household Finances (OK) | - | | | | | | | | | | | |
| Household Size (Single) | - | | | | | | | | | | | |
| Household Lifecycle (Schoolkids) | - | | | | | | | | | | | |

**Logistic models:**
Coefficients (odds ratios) > 1 = more likely in adopters
Coefficients (odds ratios) < 1 = less likely in adopters

| | |
|---|---|
| >1 odds ratio p<.01 | <1 odds ratio p<.01 |
| >1 odds ratio p<.05 | <1 odds ratio p<.05 |
| >1 odds ratio p<.1 | <1 odds ratio p<.1 |

# Adopters differ from non-adopters in their **sociodemographic characteristics**.

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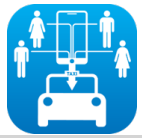







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| Household Income (Low) | - | | | | | | | | | | | |
| Household Finances (OK) | - | | | | | | | | | | | |
| Household Size (Single) | - | | | | | | | | | | | |
| Household Lifecycle (Schoolkids) | - | | | | | | | | | | | |

Adopters of **car clubs** are ...

*younger, more educated, and more likely to be in employment*

... compared to non-adopters

# Adopters differ from non-adopters in their **sociodemographic characteristics**.

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOCIODEMOGRAPHICS CHARACTERISTICS** | | | | | | | | | | | | |
| Gender (Female) | - | - | - | - | 0.50 | - | - | - | - | - | - | - |
| Age (Over 45) * | 0.40 | 0.26 | - | - | 0.10 | - | 0.12 | 0.53 | 0.22 | - | - | 0.16 |
| Education (Degree) | 3.00 | 0.32 | - | - | - | 1.90 | - | - | - | - | 1.85 | - |
| Employment * | 4.01 | 8.27 | - | 1.99 | - | 3.70 | - | 2.20 | - | 2.22 | - | 2.08 |
| Household Income (Low) * | - | - | - | 1.94 | 0.26 | - | 0.12 | 0.49 | - | 0.51 | 0.33 | - |
| Household Finances (OK) | - | - | - | - | - | - | - | - | - | - | - | - |
| Household Size (Single) * | - | - | - | - | - | - | - | 0.42 | - | 0.38 | 0.32 | 0.30 |
| Household Lifecycle (Schoolkids) | - | 2.73 | - | - | - | - | - | - | - | - | - | - |

Adopters of **digital low-carbon innovations** are ...

*younger, more likely to be in employment, higher income, living in multi-person households*

... compared to non-adopters

# Adopters differ from non-adopters in their values, **digital skills**, and **'lifestyle' activities**.

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OTHER ADOPTER CHARACTERISTICS** | | | | | | | | | | | | |
| Values: Openness To Change (3 items) | 2.08 | | | | | | | | | | | |
| Values: Self Transcendence (3 items) | - | | | | | | | | | | | |
| Values: Self Enhancement (3 items) | - | | | | | | | | | | | |
| Values: Traditional (3 items) | - | | | | | | | | | | | |
| Digital Skills: Apps (4 items) | 44.96 | | | | | | | | | | | |
| Environmental Lifestyle Activities (5 items) | - | | | | | | | | | | | |
| Technological Lifestyle Activities (5 items) | 1.71 | | | | | | | | | | | |
| Personality: Neuroticism (3 items) | - | | | | | | | | | | | |
| Personality: Openness (3 items) | - | | | | | | | | | | | |
| Personality: Extroversion (3 items) | - | | | | | | | | | | | |
| Personality: Agreeableness (3 items) | - | | | | | | | | | | | |
| Personality: Conscientiousness (3 items) | 0.48 | | | | | | | | | | | |

Adopters of **car clubs** are ...

*open to change (values), digitally skillful, technologically active, unconscientious (personality)*

... compared to non-adopters

# Adopters differ from non-adopters in their values, **digital skills**, and **'lifestyle' activities**.

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OTHER ADOPTER CHARACTERISTICS** | | | | | | | | | | | | |
| Values: Openness To Change (3 items) | 2.08 | - | - | - | - | 1.97 | - | 1.61 | - | - | - | - |
| Values: Self Transcendence (3 items) | - | - | - | - | - | - | - | 0.62 | - | - | - | - |
| Values: Self Enhancement (3 items) | - | 1.69 | - | - | - | - | - | 1.58 | - | - | - | - |
| Values: Traditional (3 items) | - | - | - | - | 0.58 | - | - | - | 0.62 | - | 1.64 | - |
| Digital Skills: Apps [redacted] * | 44.96 | 14.59 | - | 5.17 | 4.35 | - | - | 25.22 | 12.75 | 17.42 | - | - |
| Environmental Lifestyle Activities [redacted] * | - | - | - | 1.44 | - | 1.71 | - | 1.76 | - | 1.50 | - | - |
| Technological Lifestyle Activities [redacted] * | 1.71 | - | 2.62 | - | 2.41 | 2.89 | 2.49 | - | - | - | 3.66 | 2.94 |
| Personality: Neuroticism (3 items) | - | - | - | - | - | - | - | - | - | - | 1.42 | - |
| Personality: Openness (3 items) | - | - | - | - | - | - | - | - | - | - | - | - |
| Personality: Extroversion (3 items) | - | 1.95 | - | - | 1.52 | 1.57 | - | - | - | - | - | - |
| Personality: Agreeableness (3 items) | - | - | - | - | - | 0.45 | - | - | - | - | - | - |
| Personality: Conscientiousness (3 items) | 0.48 | - | 0.61 | - | - | - | - | - | 0.65 | 1.73 | - | - |

Adopters of **digital low-carbon innovations** are ...

*digitally skillful, environmentally active, technologically active*

... compared to non-adopters

# Adopters can also be differentiated in their values, digital skills, and 'lifestyle' activities.

Social Influence and *disruptive* Low Carbon Innovations

**41%**

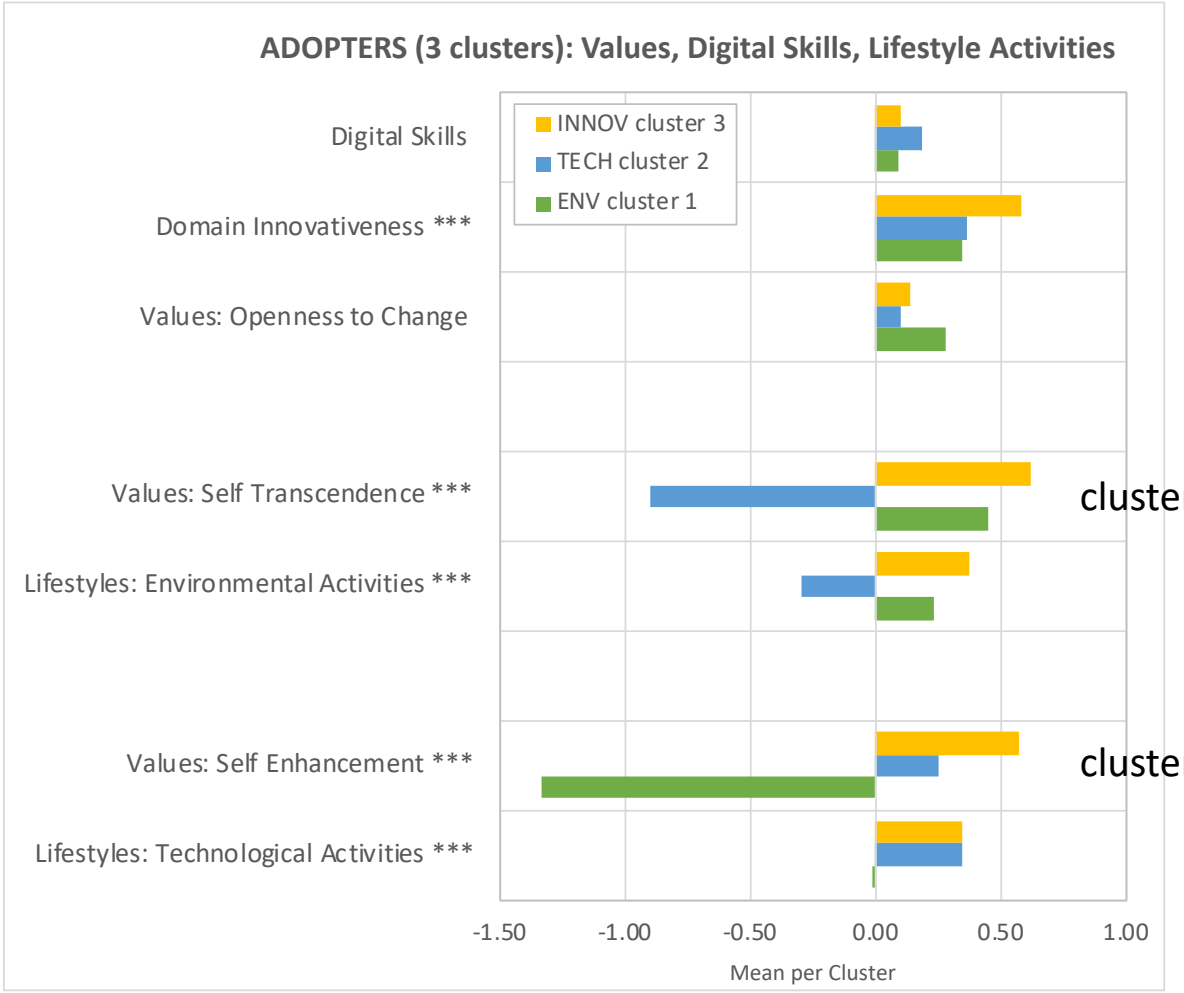
Innovators:
*- score highly on everything!*

**38%**

Technological early adopters:
*- egoistic values, tech. lifestyles*

**20%**

Environmental early adopters:
*- biospheric values, env. lifestyles*




clustering variable

clustering variable

# Four key mechanisms of innovation diffusion

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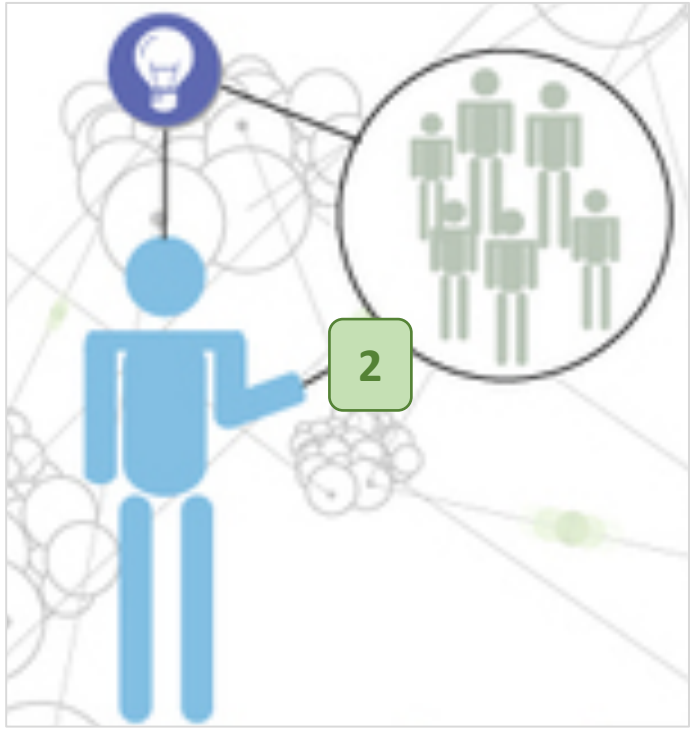


1 **People are different (heterogeneity)**

- varying tolerance for uncertainty, personal situation

*e.g., age, income, technophilia*

2 **Interpersonal transmission**

- information exchange through social contact

*e.g., word of mouth (WoM), peer effects*

3 **Social networks of interaction**

- number, frequency and diversity of social interactions

*e.g., travel & mixing*

4 **Attributes**

- characteristics of innovation (which make it appealing)

*e.g., ease of use, compatibility*

# **Interpersonal exchange** of information on low-carbon innovations = **social influence**.

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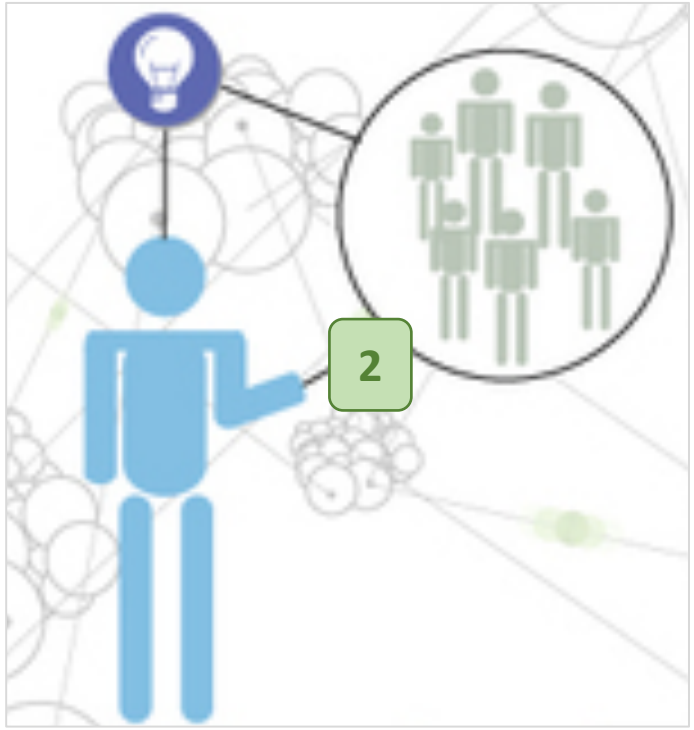


word of mouth (WoM)
e-WoM
neighbourhood effects
social norms

meta-analysis of 21 studies of social influence on EV adoption: all 4 mechanisms had similar effect sizes

Pettifor, H. et al. (2017). "Social influence in the global diffusion of alternative fuel vehicles – A meta-analysis." *Journal of Transport Geography* 62: 247-261.

# Adopters differ from non-adopters in their **exposure and receptiveness** to social influence.

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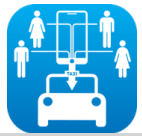







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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **INFORMATION FLOWS** | | | | | | | | | | | | |
| Domain Innovativeness (3 items) | 2.63 | | | | | | | | | | | |
| Social Influence (8 items) | 4.51 | | | | | | | | | | | |
| Info Sources Inter-Personal (4 types) | - | | | | | | | | | | | |
| Info Sources General Media (2 types) | - | | | | | | | | | | | |

Adopters of **car clubs**...

*are more innovative (in a transport context),*

*receive more information through inter-personal exchange (about car clubs)*

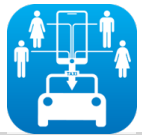
... compared to non-adopters,

*but don't differ in how they seek information to shape their opinion*

# Adopters differ from non-adopters in their **exposure and receptiveness** to social influence.

SILCI
Social Influence and *disruptive* Low Carbon Innovations









| Independent Variables | CAR CLUBS | P2P CAR-SHARING | RIDE-SHARING | SHARED RIDE-HAILING | EVS | E-BIKES | DIGITAL FOOD HUBS | MEAL KITS | 11TH HOUR APPS | SMART HOMES | SMART LIGHTING | SMART HOME APPLIANCES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **INFORMATION FLOWS** | | | | | | | | | | | | |
| Domain Innovativeness [redacted] * | 2.63 | 2.89 | - | - | 1.64 | 2.69 | 3.99 | 1.91 | 3.50 | 2.81 | 6.88 | 2.01 |
| Social Influence [redacted] * | 4.51 | - | 2.57 | 2.31 | 7.66 | 2.49 | - | 1.89 | 1.52 | 2.13 | - | 1.46 |
| Info Sources Inter-Personal (4 types) | - | 1.79 | 2.34 | - | - | - | - | - | - | 0.40 | - | - |
| Info Sources General Media (2 types) | - | - | 0.56 | - | - | - | - | - | - | 2.12 | - | - |

Adopters of **digital low-carbon innovations**...

*are more innovative (in a transport / food / homes context),*

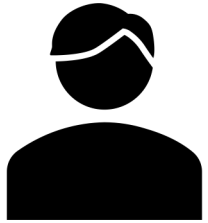
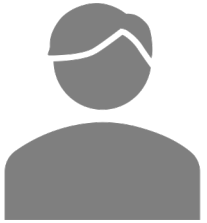
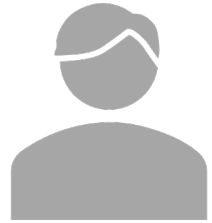
*receive more information through inter-personal exchange (about the innovation)*

... compared to non-adopters

*but don't differ in how they seek information to shape their opinion*

# All 4 social influence mechanisms consistently explains adoption, **and propensity to adopt**.

SILCI
Social Influence and *disruptive* Low Carbon Innovations

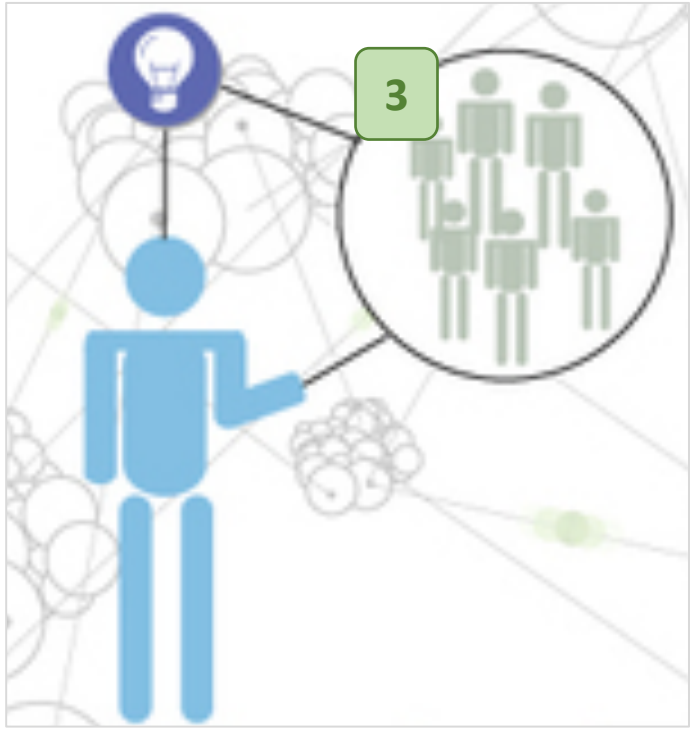
| | **adopters** | **high propensity non-adopters** | **low propensity non-adopters** |
|---|---|---|---|
| word of mouth (WoM) | > *** | > *** | |
| e-WoM | > *** | > *** | |
| neighbourhood effects | > *** | > *** | |
| social norms | > *** | > *** | |

eWoM: largest effect

same for all 3 clusters: innovators, tech, env

# Four key mechanisms of innovation diffusion

SILCI
Social Influence and *disruptive* Low Carbon Innovations




**1 People are different (heterogeneity)**

- varying tolerance for uncertainty, personal situation

*e.g., age, income, technophilia*

**2 Interpersonal transmission**

- information exchange through social contact

*e.g., word of mouth (WoM), peer effects*

**3 Social networks of interaction**

- number, frequency and diversity of social interactions

*e.g., travel & mixing*

**4 Attributes**

- characteristics of innovation (which make it appealing)

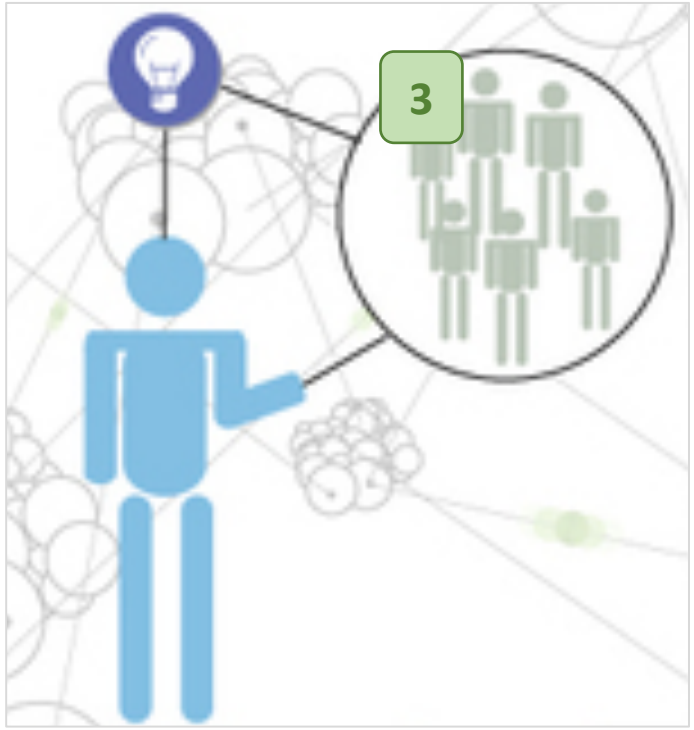
*e.g., ease of use, compatibility*

# **Social network size & structure** mediate flows of information between people.

SILCI
Social Influence and *disruptive* Low Carbon Innovations

"*The slow pace of diffusion is often a result of network structures*" (Valente 2010)

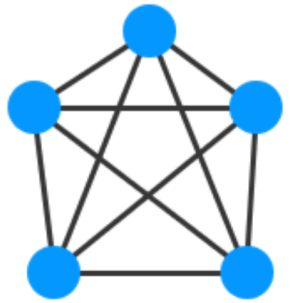
"*Social network characteristics fundamentally impact the dynamic (communication) processes within*" (Borgatti et al. 2014)



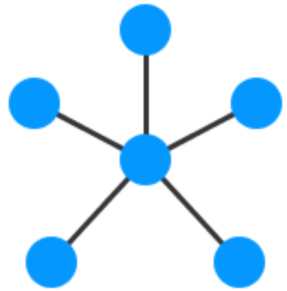

homophily

high

low

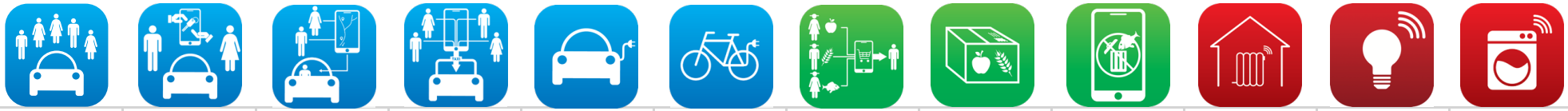


transitivity



# Adopters differ from non-adopters in their use of **social media**... but not in their social networks.

SILCI
Social Influence and *disruptive* Low Carbon Innovations



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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOCIAL NETWORK STRUCTURE** | | | | | | | | | | | | |
| Social Media Intensity (# types * hrs online) | 1.15 | | | | | | | | | | | |
| Social Media Usage (hrs online) | - | | | | | | | | | | | |
| Strong Ties (#) | - | | | | | | | | | | | |
| Strong Ties Transitivity (Strong) | - | | | | | | | | | | | |
| Strong Ties Homophily (Age) | - | | | | | | | | | | | |
| Strong Ties Homophily (Income) | - | | | | | | | | | | | |
| Strong Ties Homophily (Local) | - | | | | | | | | | | | |
| Strong Ties Homophily (Family) | - | | | | | | | | | | | |
| Weak Ties (#) | - | | | | | | | | | | | |

Adopters of **car clubs**...

*have more diverse online networks (in general),*

... compared to non-adopters

*but have social networks of similar sizes, transitivity, and homophily (in general)*

# Adopters differ from non-adopters in their use of **social media**... but not in their social networks.

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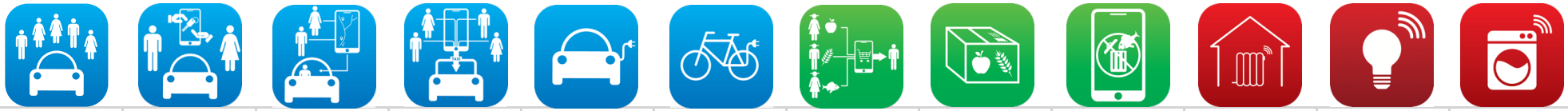

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SOCIAL NETWORK STRUCTURE** | | | | | | | | | | | | |
| Social Media Intensity ([redacted])* | 1.15 | - | 1.09 | 1.06 | 1.20 | 1.11 | 1.13 | - | 1.08 | 1.17 | 1.12 | 1.20 |
| Social Media Usage (hrs online) | - | 3.95 | - | - | - | - | - | 1.65 | - | - | - | - |
| Strong Ties (#) | - | 0.87 | - | - | - | 0.83 | - | - | - | - | - | - |
| Strong Ties Transitivity (Strong) | - | - | - | - | - | - | - | - | - | - | - | - |
| Strong Ties Homophily (Age) | - | 0.38 | - | - | - | 0.31 | - | - | - | - | - | - |
| Strong Ties Homophily (Income) | - | 4.73 | - | - | - | - | - | - | - | - | 2.05 | - |
| Strong Ties Homophily (Local) | - | 3.06 | - | - | - | - | - | - | - | - | - | - |
| Strong Ties Homophily (Family) | - | - | - | - | - | - | - | - | - | - | - | 2.15 |
| Weak Ties (#) | - | - | - | - | - | 1.03 | - | - | - | - | - | - |

Adopters of **digital low-carbon innovations** ...

*have more diverse online networks (in general),*

... compared to non-adopters

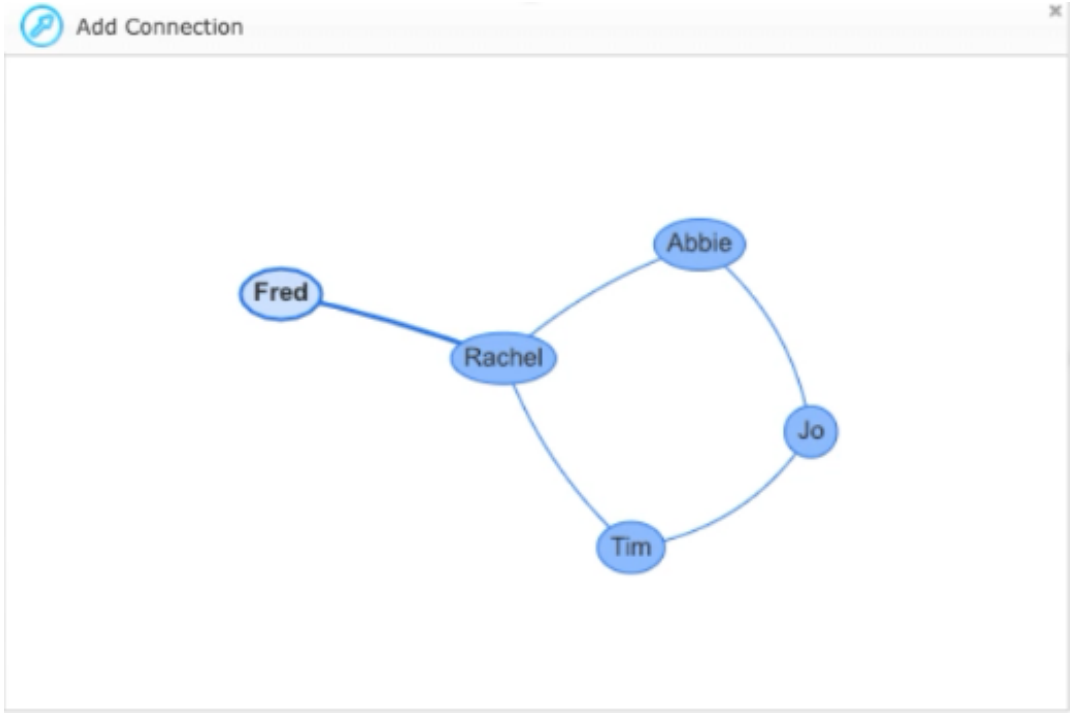
but have social networks of similar sizes, transitivity, and homophily (in general)

# Mapping **innovation-specific information flows** makes the role of social networks clearer.

SILCI
Social Influence and *disruptive* Low Carbon Innovations

Looking back over the last six months, please tell us the first name or initials of up to 5 close friends.

| | |
|---|---|
| Friend 1 | |
| Friend 2 | |
| Friend 3 | |
| Friend 4 | |
| Friend 5 | |




... generated 2850 alters from samples of 353 adopters and 360 non-adopters of smart home technologies

Vrain, E. and C. Wilson (under review). "Social networks and communication behaviour underlying smart home adoption." *Environmental Innovation and Societal Transitions*.

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SILCI
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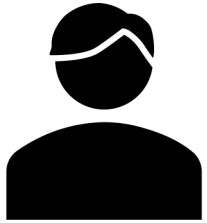
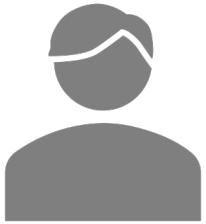


**adopters**



**non-adopters**

| | | |
|---|---|---|
| actively seek info from diverse sources | > *** | opinions shaped by strong ties ... |
| opinion leaders | > *** | |
| communicate more about innovations | > *** | but 3 times less likely to know anyone with smart home technology |

*but*

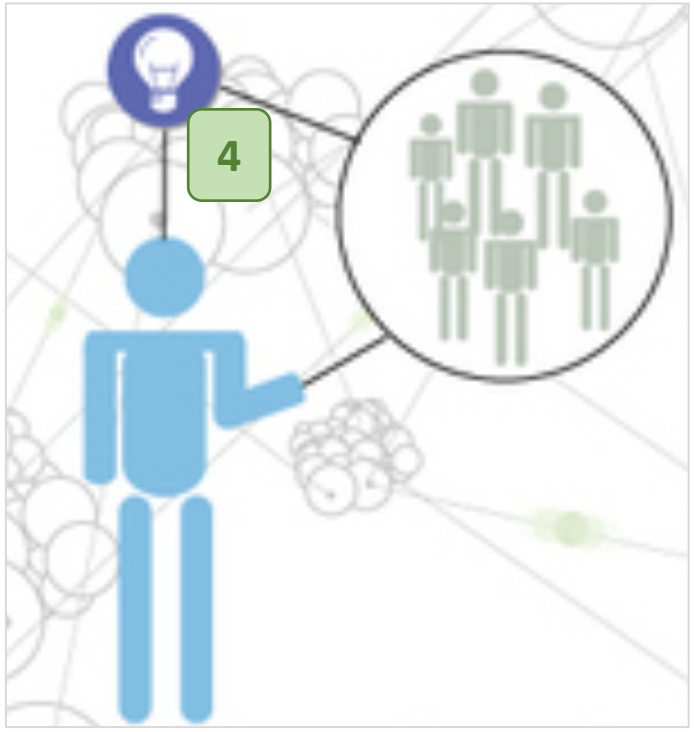
**high transitivity (= cliquey)**

**high income homophily**

Vrain, E. and C. Wilson (under review). "Social networks and communication behaviour underlying smart home adoption." *Environmental Innovation and Societal Transitions*.

# Four key mechanisms of innovation diffusion

SILCI
Social Influence and *disruptive* Low Carbon Innovations




**1 People are different (heterogeneity)**

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*e.g., age, income, technophilia*

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*e.g., word of mouth (WoM), peer effects*

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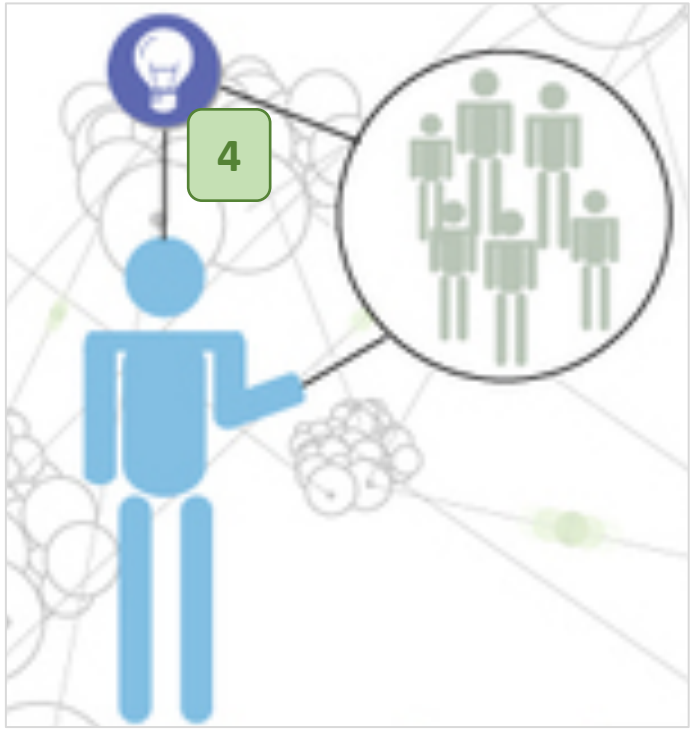
*e.g., travel & mixing*

**4 Attributes**

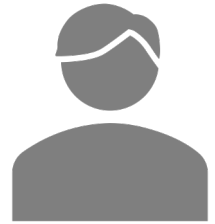
- characteristics of innovation (which make it appealing)

*e.g., ease of use, compatibility*

# Adopters differ from non-adopters in their perceptions of **innovation attributes**.



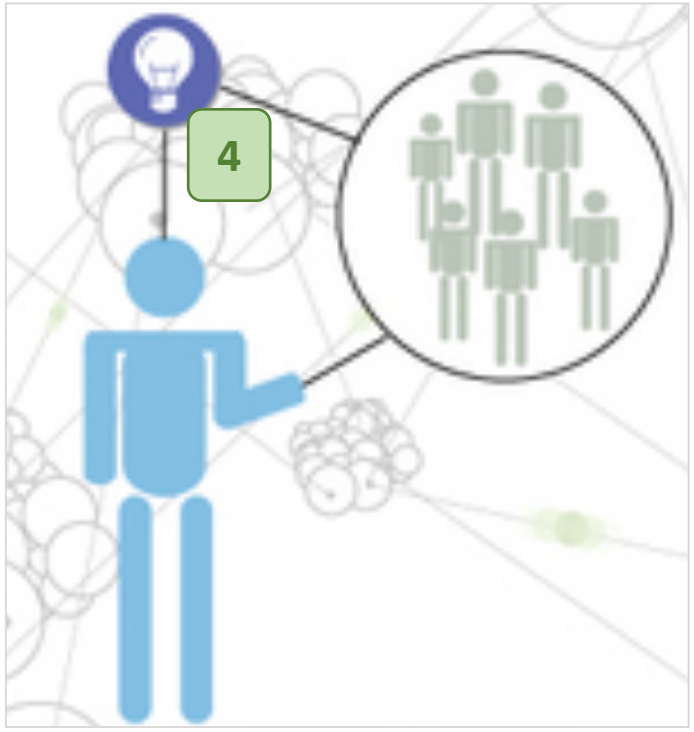

**adopters**



non-adopters

| | | |
|---|---|---|
| relative advantage | > | *** |
| ease of use | > | *** |
| compatibility | > | *** |
| trialability | | |
| observability | | |
| *climate benefits* | | |

# Do innovations with ‘weak’ attributes need more specific types of social influence? *No.*




relative advantage
ease of use
compatibility
trialability
observability

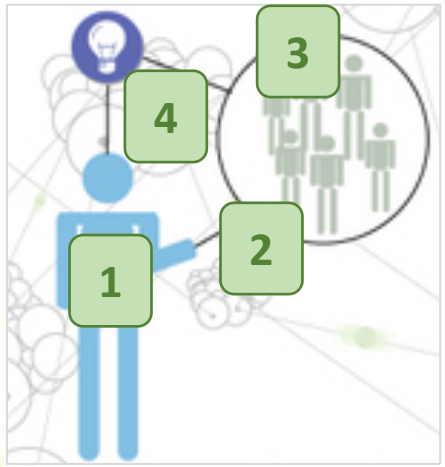
x
x

WoM (word of mouth)
eWoM
peer effects
social norms

no evident links between *specific* attributes and *specific* social influences

# Summary of new evidence on the diffusion of digital low-carbon innovations

SILCI
Social Influence and *disruptive* Low Carbon Innovations




## 1 People are different (heterogeneity)

- adopters are younger, in employment, with higher digital skills
- adopters differentiate into innovators, egoistic techies, biospheric enviros

## 2 Transmission mechanisms

- adopters receive more social influence of all types (particularly eWoM)
- adopters have higher domain innovativeness (= opinion formers)

## 3 Social networks of interaction

- adopters have similar social network size & diversity (except online)
- info flows from adopters can get trapped in homophilous cliques

## 4 Attributes

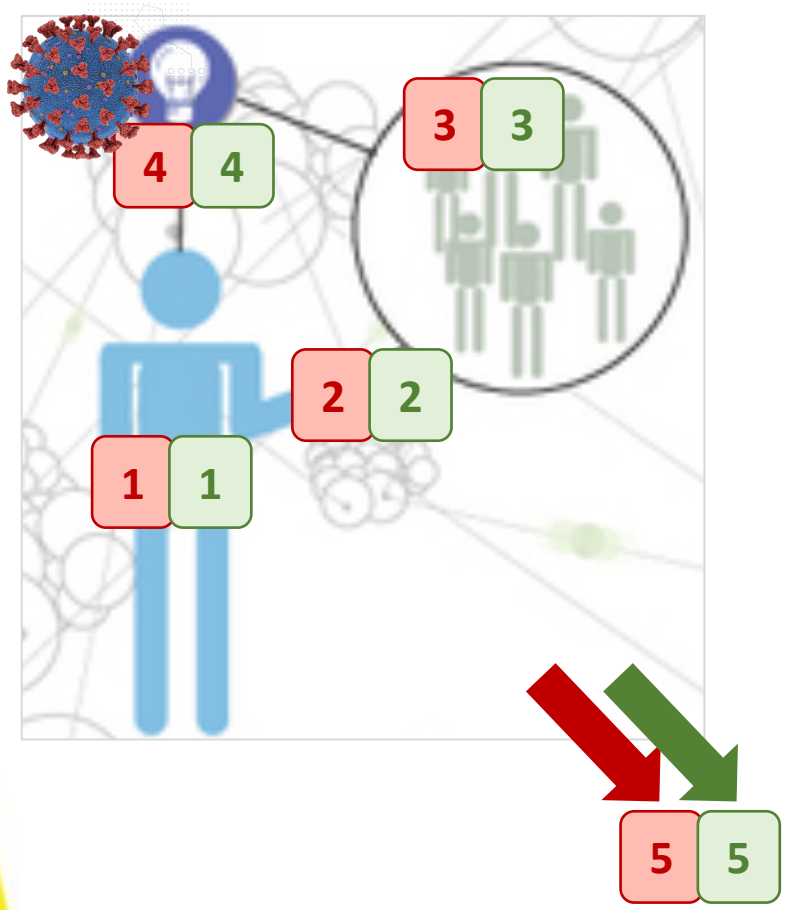
- adopters perceive higher relative advantage, ease of use, compatibility
- non-core attributes differentiate appeal of innovations from mainstream

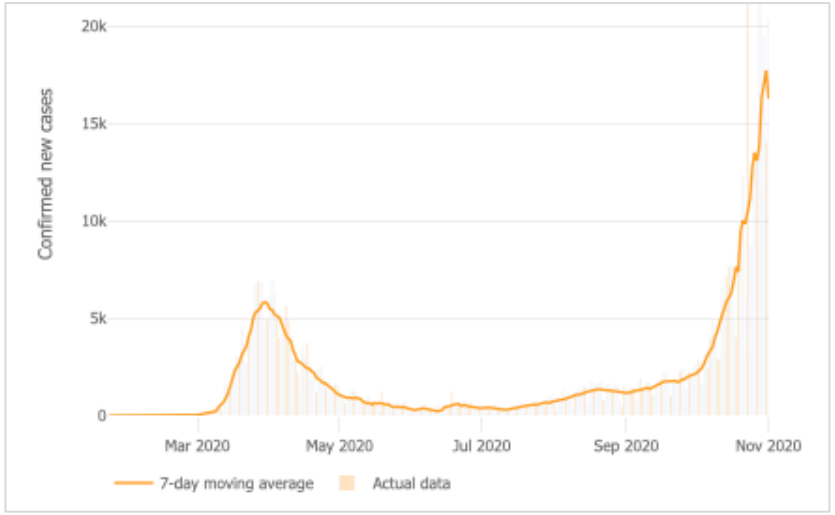
# Overview of talk.

SILCI
Social Influence and *disruptive* Low Carbon Innovations

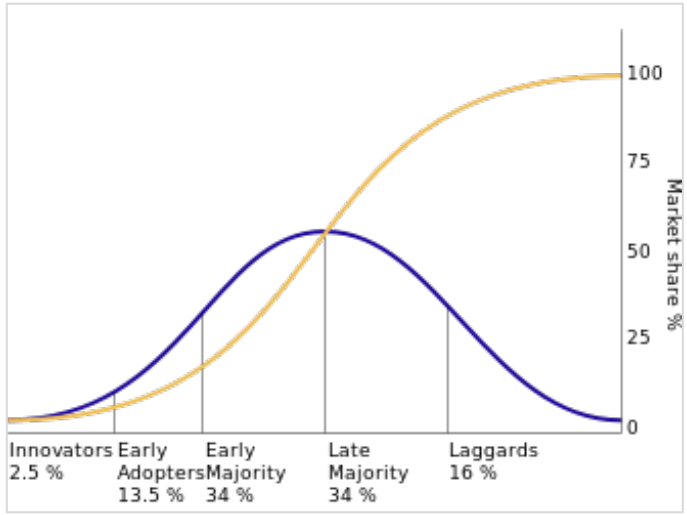
1. Potential climate benefits of digital consumer innovations
2. How new things spread
3. New evidence on the diffusion of digital low-carbon innovations
4. Implications

# Mechanisms of transmission or diffusion determine outcomes (e.g., growth rates).



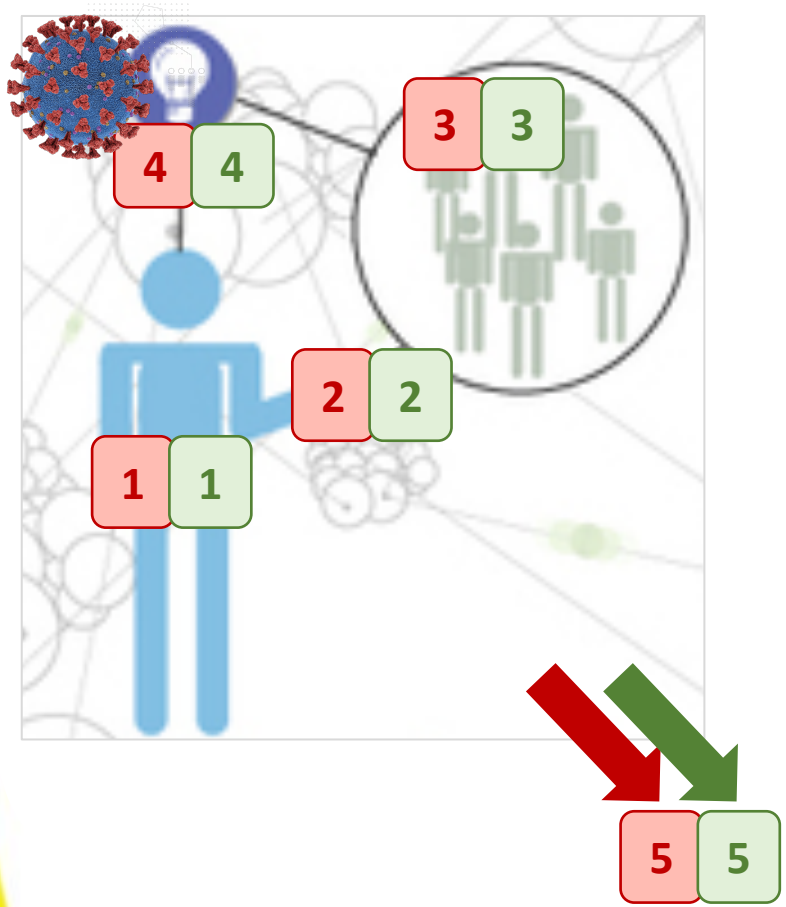




Germany: New daily confirmed Covid19 cases.
[Johns Hopkins: coronavirus.jhu.edu/data/new-cases]




en.wikipedia.org/wiki/Diffusion_of_innovations

# Mechanisms of transmission or diffusion also point to control measures.




| HOW NEW THINGS SPREAD | SLOWING THE SPREAD (of coronavirus) | SPEEDING UP THE SPREAD (of digital low-carbon innovations) |
|---|---|---|
| **People are different** | isolate spreaders, protect vulnerable | recruit opinion leaders, incentivise early adopters |
| **Inter-personal transmission** | physical distancing, quarantine | neighbourhood schemes, (digital) open houses |
| **Social networks of interaction** | travel bans, rule of six | cross-national exchange, eWoM on social media |
| **Attributes** | *[indirectly – drugs, vaccines]* | product development, market differentiation |

** if and when it's safe **

**Social influence** can accelerate *potential* climate benefits from widespread adoption ...

... so like other accelerants,
should be a target for public policy.

# **Social influence** can accelerate *potential* climate benefits from widespread adoption ...

SILCI
Social Influence and *disruptive* Low Carbon Innovations

| Global 2°C scenarios | Technological learning only | Social learning only | Both types of learning |
|---|---|---|---|

‘**social learning**’ about an innovation (reducing perceived risk)

‘**technological learning**’ (reducing costs and improving performance)

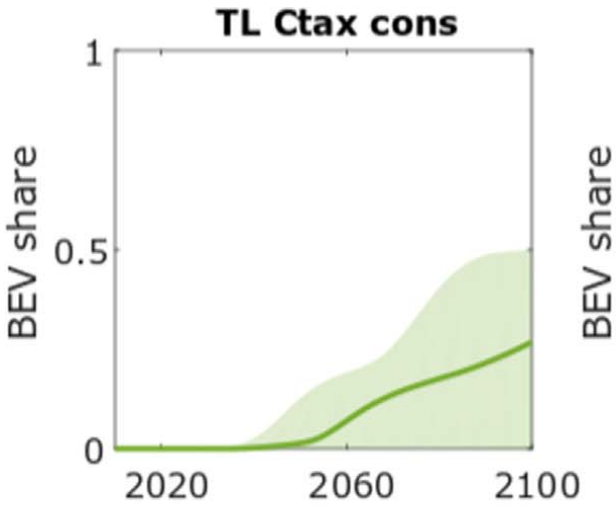
Edelenbosch, O. et al. (2018). "Interactions between social learning and technological learning in electric vehicle futures." *Environmental Research Letters* 13(12): 124004.

# **Social influence** can accelerate *potential* climate benefits from widespread adoption …

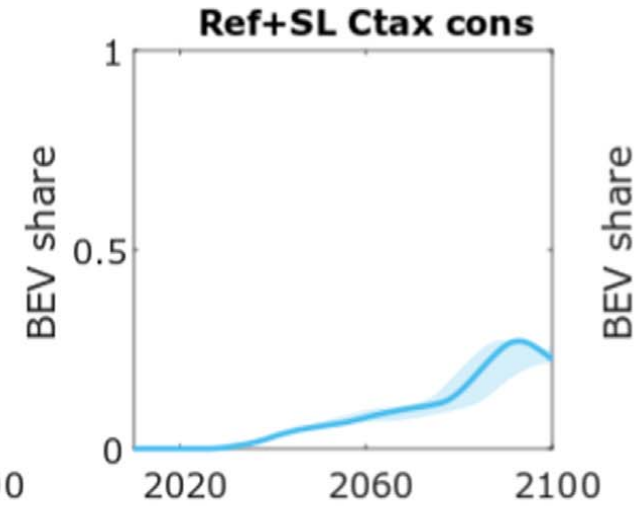
SILCI
Social Influence and *disruptive* Low Carbon Innovations

Global 2°C scenarios

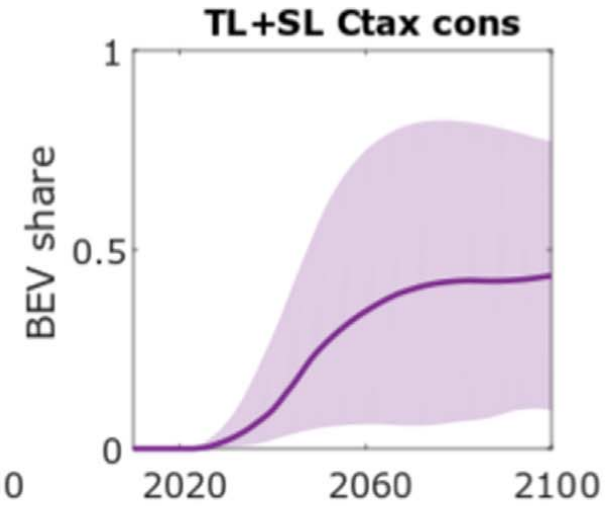
Technological learning only




Social learning only




Both types of learning




‘**social learning**’ about an innovation (reducing perceived risk)
+
‘**technological learning**’ (reducing costs and improving performance)
=
accelerated diffusion

Edelenbosch, O. et al. (2018). "Interactions between social learning and technological learning in electric vehicle futures." *Environmental Research Letters* 13(12): 124004.

# How do new things spread?
# The diffusion of digital low-carbon innovations

Oxford Energy Colloquium

November 2020

Charlie Wilson

silci.org

SILCI

Social Influence and *disruptive* Low Carbon Innovations

Tyndall Centre

for Climate Change Research

erc European Research Council

Starting Grant #678799